

CLAIMS

What is claimed is:

1. A step voltage controlling device, comprising:
 - a multiple tap step-down autotransformer connected to an AC input voltage applied across first and second AC voltage input terminals;
 - a voltage sensing block connected across the first and second AC voltage input terminals;
 - a current sensing block connected between the first AC voltage input terminal and a first output terminal;
 - a pulse forming block operatively connected to receive signals from each of the voltage sensing block and the current sensing block and to provide at least two pulsed output signals responsive to the received signals;
 - a controller block which receives the at least two pulsed output signals from the pulse forming block and which responsively provides a plurality of command signals;
 - a plurality of switch blocks each receiving an associated one of the plurality of command signals from the controller block,
 - wherein one switch block of the plurality of switch blocks selectively electrically couples the second AC voltage input terminal and a second output terminal in response to the associated one of the plurality of command signals from the controller block,
 - wherein remaining ones of the plurality of switch blocks each separately and selectively electrically couples an associated output tap of the multiple tap step-down autotransformer to the second output terminal,
 - wherein the controller block at least initially generates a command signal which turns on the one switch block so as to provide a full output voltage between the first and second output terminals,
 - wherein, after a nominal period of time, the controller block is capable of initiating a reduction of an output voltage applied voltage across the first and second output terminals by removing the command signal applied to the one switch block so as to turn off the one switch block and to turn on another one of the plurality of switch

blocks so as to provide a reduced output voltage between the first and second output terminals.

2. A method for step controlling a voltage applied to a load, the method comprising:
 - providing a multiple tap step-down autotransformer;
 - providing multiple voltage switching blocks each coupled electrically to various taps of the multiple tap step-down autotransformer;
 - sensing an input voltage;
 - sensing a load current;
 - forming plural pulsed signals based upon the sensed input voltage and load current;
 - processing the plural pulsed signals and generating command signals for each of the multiple voltage switching blocks;
 - determining a zero-crossing point of the load current; and
 - controlling an instantaneous variation of a voltage applied to the load by synchronizing the determined zero crossing point.